Section 3

Water Quantity

This section addresses water quantity issues (availability and use), while water quality in the Chattahoochee basin is the subject of Section 4. Water use in the Chattahoochee River Basin is measured by estimates of freshwater withdrawn from ground and surface water sources, while water availability is assessed based on annual surface water flows and ground water storage. Saline water is not used in the basin. Uses of water include both consumptive uses (in which the water is no longer available to the basin) and non-consumptive uses (in which the water is returned to the basin after use). About 20 percent of total Municipal and Industrial (M&I) water withdrawals in 1990 was not returned to surface or ground water sources, primarily due to evaporative losses.

Surface water is the primary water source in the Piedmont Province of the Chattahoochee River Basin because ground water yields from crystalline rock aquifers tend to be low. Within the Coastal Plain province, aquifer yields are higher and ground water withdrawals are an important part of the total water budget. Although most public-supply withdrawals in the Piedmont Province are from surface-water sources, with the exception of counties near or immediately below the Fall Line, most public-supply water in the Coastal Plain comes from ground water sources. The Floridan aquifer system supplied most of the ground water used in the basin in 1990, followed by the Claiborne, Clayton, Piedmont crystalline rock, and the Providence aquifer systems. As previously mentioned, the two sources of supply are not independent, because ground water discharge to streams is important in maintaining dry-weather flow. Thus, withdrawal of ground water can, under certain conditions, also result in reduction in surface water flow.

Water use in the Chattahoochee basin is increasing, resulting in greater demands on what are essentially finite supplies. Total water withdrawals in the Apalachicola-Chattahoochee-Flint basin increased by 42 percent between 1970 and 1990 (Couch et al., 1996). During this period, total surface-water withdrawals increased by 29 percent; however, ground water withdrawals increased by 240 percent.

In the following sections, water availability is discussed from a number of viewpoints. First, the important topic of drinking water is presented, which includes both surface and ground water supplies. Then, general surface water availability is presented, followed by ground water availability.

3.1 Drinking Water Supply

3.1.1 Drinking Water Sources

Chattahoochee River Basin water is the most utilized surface water source for drinking water in Georgia. The Chattahoochee River, and tributaries, serve a majority of the Atlanta metropolitan population including Fulton, DeKalb, Gwinnett, Forsyth, Douglas and Cobb counties, as well as the city of Columbus. Most surface water intakes are located on the Chattahoochee River, smaller tributaries and Lake Lanier. Communities located in the headwater area of the basin and below Columbus utilize ground water pumped from wells as a source of drinking water. The

locations of surface water intakes within each of the four Hydrologic Units of the Chattahoochee River Basin are shown in Figures 3-1 through 3-4.

The Chattahoochee River Basin provides drinking water for nearly 3 million people in the state of Georgia by municipal or privately owned public water systems. A public water system pipes water for human consumption and has at least 15 service connections or regularly serves at least 25 individuals 60 or more days out of the year. Public water system sources include surface water pumped from rivers and creeks or ground water pumped to the surface from wells or naturally flowing from springs. There are three different types of public water systems: community, non-community non-transient, and non-community transient.

A community public water system serves at least 15 service connections used by year round residents or regularly serves at least 25 year-round residents. Examples of community water systems are municipalities, such as cities, counties, and authorities which serve residential homes and businesses located in the areas. Other types of community public water systems include rural subdivisions or mobile home parks which have a large number of homes connected to a private public water system, usually a small number of wells.

A non-community non-transient public water system serves at least 25 of the same persons over six months per year. Examples of non-community non-transient systems are schools, office buildings, and factories which are served by a well.

A non-community transient public water system does not meet the definition of a non-community non-transient system. A non-community transient public water system provides piped water for human consumption to at least 15 service connections or which regularly serves at least 25 persons at least 60 days a year. Examples of a non-community transient are highway rest stops, restaurants, motels, and golf courses.

Private domestic wells serving individual houses are not covered by the state's public water system regulations. However, the regulations for drilling domestic wells are set by the Water Well Standards Act and the local health department is responsible for insuring water quality.

In the Chattahoochee River Basin there are approximately 56 community public water systems utilizing surface water and serving 2,872,087 people and 113 community public water systems utilizing ground water and serving approximately 45,889 people.

3.1.2 Drinking Water Demands

Drinking water demands are expected to increase due to the population growth in the Atlanta Metro area, especially in the subdivision communities in Gwinnett, Forsyth, Hall, Cobb and Douglas counties. Due to current and forecasted growth, many of the Atlanta metropolitan counties have adopted water conservation techniques, including ordinances for low flow household plumbing in new construction, limits on outside watering during the summer months, increased water rates to curb excess use, and public education. Projections of drinking water demand volumes are provided in Section 3.2 (surface water) and 3.3 (ground water).

3.1.3 Drinking Water Permitting

The Georgia Safe Drinking Water Act of 1977 and the Rules for Safe Drinking Water (391-3-5) adopted under the act require any person who owns and/or operates a public water system to obtain a permit to operate a public water system from the Environmental Protection Division.

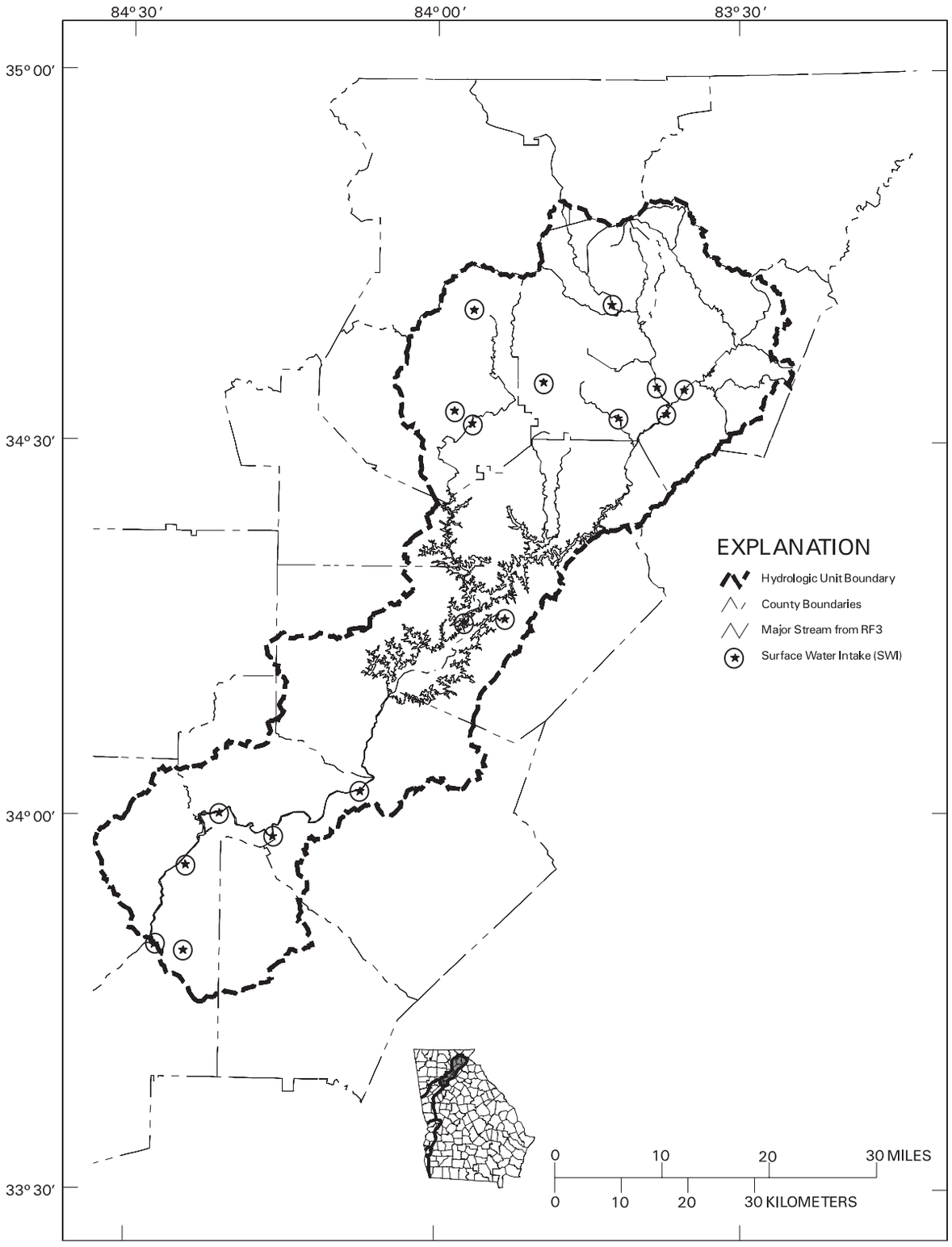

Figure 3-1. Surface Water Intakes, Upper Chattahoochee River Basin, HUC 03130001

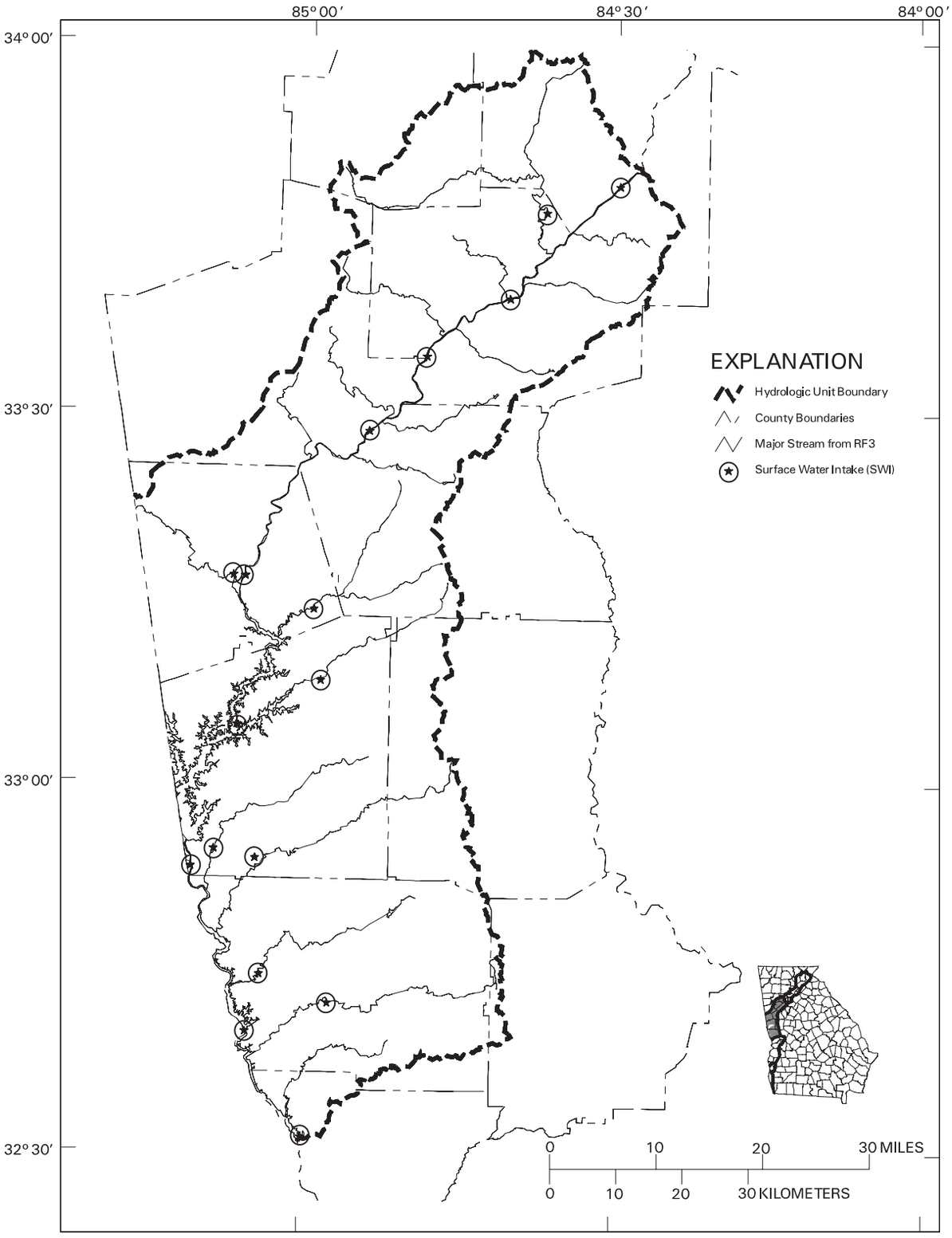

Figure 3-2. Surface Water Intakes, Middle Chattahoochee River Basin, HUC 03130002

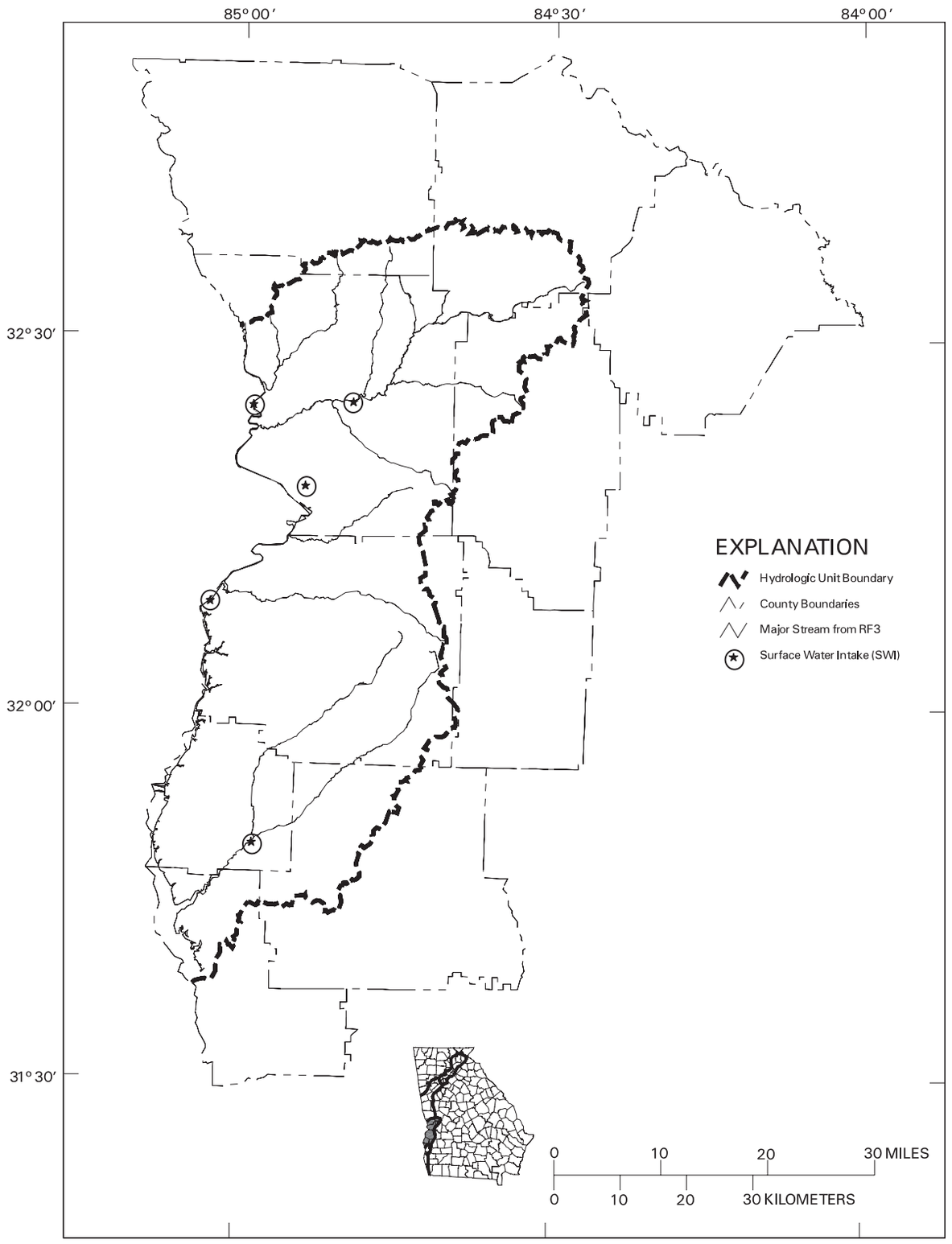

Figure 3-3. Surface Water Intakes, Middle Chattahoochee River Basin, HUC 03130003

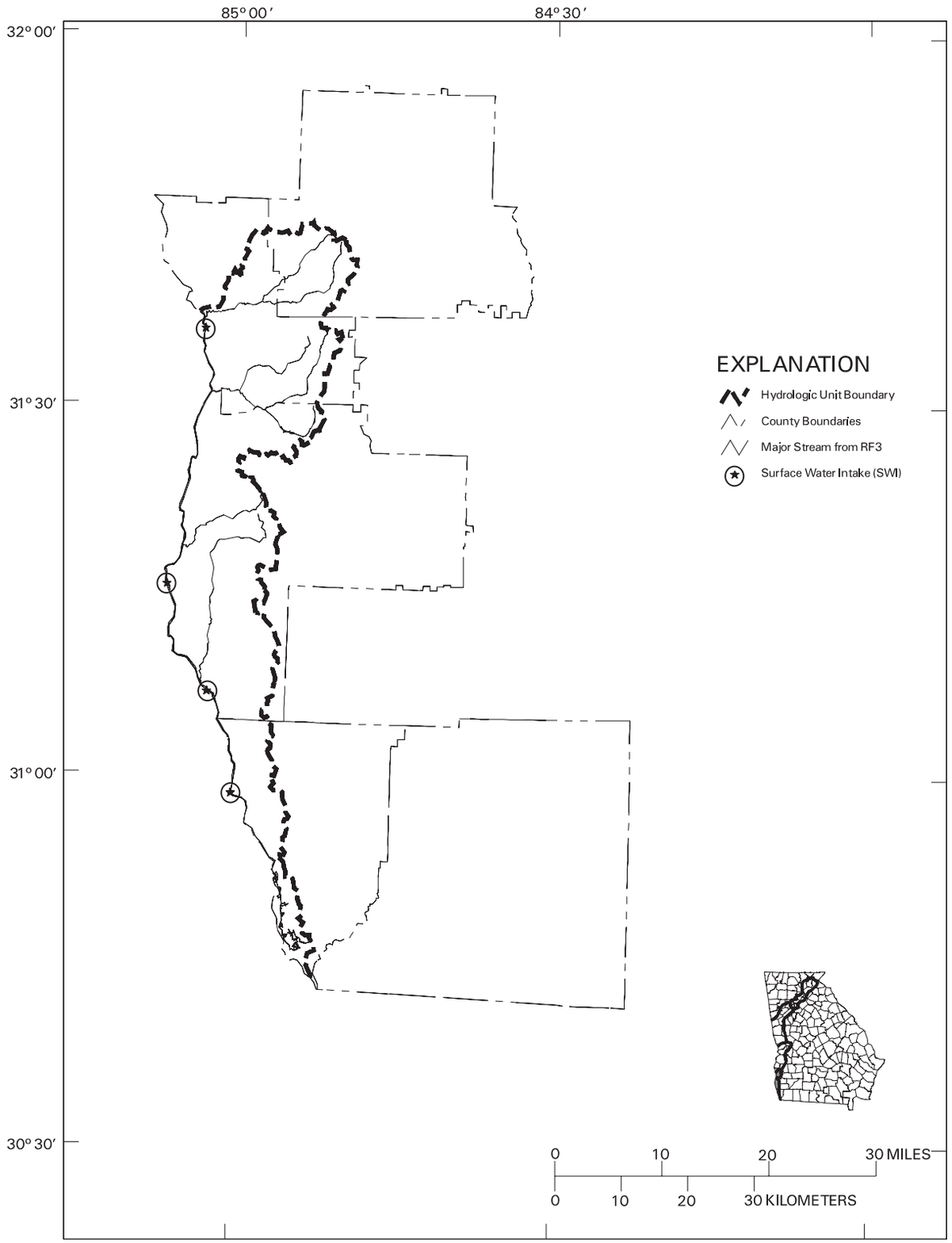

Figure 3-4. Surface Water Intakes, Lower Chattahoochee River Basin, HUC 03130004

The permitting process is set in three phases: Inquiry & Discovery, Technical Review and Permitting. During these phases the owner must provide detailed description of the project; demonstrate the reliability of water source site; render plans and specifications of demonstrating construction integrity of wells, plants and distribution system; conduct preliminary water sample testing; and submit legal documentation including application to operate a public water system. Permits contain specific conditions the owner must meet for different types of water sources, plants, and distribution systems, including list of approved water sources, filter rates, disinfection and treatment requirements, operator certification, documentation and reporting requirements, compliance with water sample testing schedule, and number of allowed service connections. Permits are issued for ten (10) years and are renewable. There are 332 active and permitted systems in the Chattahoochee River Basin.

Summary of EPD Drinking Water Program

The Federal Environmental Protection Agency (EPA) promulgates the rules and regulations for drinking water and passes the responsibility of enforcing the rules to the states with primacy, such as the state of Georgia. In Georgia, public water systems are regulated by the Drinking Water Program (DWP) of the Environmental Protection Division (EPD). The Drinking Water Program in the state of Georgia is divided into Drinking Water Compliance Program (DWCP) and Drinking Water Permitting Program (DWPP). Both programs oversee the 2618 public water systems in the state of Georgia, including the 332 public water systems in the Chattahoochee River Basin.

3.2 Surface Water Quantity

3.2.1 Surface Water Supply Sources

Surface water supplies in the Chattahoochee basin include water in rivers, ponds, and reservoirs, including a series of major impoundments on the Chattahoochee mainstem (see Section 2.1.4). Total median annual flow in the Chattahoochee past Andrews Lock and Dam is approximately 2.1×10^6 million gallons per year. Reservoirs provide a storage capacity within the basin of approximately 1.2×10^6 million gallons.

3.2.2 Surface Water Supply Demands and Uses

Municipal and Industrial Demand

Municipal and industrial (M&I) water demands include public supplied and private supplied residential, commercial, governmental, institutional, industrial, manufacturing, and other demands such as distribution system water losses. Total M&I water demand in the Georgia part of the Chattahoochee basin (exclusive of power generation cooling water) is expected to increase from 435 million gallons per day (MGD) in 1995 to 446 MGD in 2000 and to 462 MGD in 2005 (Davis et al., 1996) with passive conservation programs in place (see Table 3-1). These passive conservation measures include increases in water use efficiency resulting from recently implemented plumbing codes, the natural replacement of water fixtures, and known increases in water and wastewater prices since 1990. Additionally, in 1995 approximately 70 MGD was supplied from the Chattahoochee basin to regions outside the basin boundary. This demand is projected to increase to 75 MGD in 2000 and to 80 MGD in 2005.

Existing permits for municipal and industrial (non-agricultural) surface water withdrawals in the Chattahoochee River Basin are shown in Table 3-2 (including permits for power generation

Table 3-1: Projected Municipal and Industrial Water Demand, Chattahoochee River Basin

Year	Demand (MGD)	Percent Returned to River
1990	441	83%
1995	435	83%
2000	446	83%
2005	462	82%
2010	480	82%
2015	490	83%
2020	493	83%
2025	494	83%
2030	494	84%
2050	534	85%

cooling water). One-quarter of the non-power generation 1990 demand in the Chattahoochee basin is used in Fulton County. By 2050, this county demand is projected to increase to 31 percent of the total basin demand. In 1990, the residential sectors of the Chattahoochee basin used about the same amount of water as the manufacturing sector (36 percent and 38 percent, respectively). However, by 2050 the residential demand for water is projected to increase to 44 percent of demand in the Chattahoochee basin, while the demand for water by the manufacturing sector is projected to decline to 21 percent of the 2050 basin total demand.

Ninety-nine percent of the Chattahoochee basin M&I water demand in 2005 is projected to be supplied by surface water withdrawals (458 MGD). The ground water M&I withdrawals are projected to be only 4 MGD in the Chattahoochee basin.

Most of the M&I demand is not consumed, but is instead returned back to the Chattahoochee River Basin as treated waste water. In 2005 approximately 82 percent of the in-basin demand is projected to be returned to the river (see Table 3-1).

Agricultural Water Demand

In 1992 approximately 117,000 acres in the Georgia portion of the Chattahoochee River Basin were devoted to the production of crops, orchards, turf, nursery, and aquaculture, and 7,600 acres were irrigated. The number of irrigated acres in the Chattahoochee basin is expected to increase to 8,800 by year 2000.

The 1992 agricultural water demand for counties in the Piedmont part of the Chattahoochee River Basin (Georgia and Alabama) was 10,401 MG (50%) and for the Coastal Plain part of the Chattahoochee River Basin 10,394 MG (50% of the total; see Table 3-3). Within Georgia, about 70% of the demand is in the Piedmont section, due to the comparatively small land area of the basin contained within the Coastal Plain. More than half the Coastal Plain demand in the basin is from Alabama. The total agricultural water demand in the entire Chattahoochee River Basin is expected to increase from 21,000 MG (57 MGD) in 1992 to 27,000 MG (75 MGD) in 2000 and to 33,000 MG (92 MGD) in 2010 (NRCS, 1996).

Table 3-2. Permits for Surface Water Withdrawals in the Chattahoochee River Basin

Facility	Source	24 hr Max (MGD)	Mo. Avg (MGD)	County
Georgia Permits				
Fort Benning Water Treatment Plant	Upatoi River	12.00	10.00	Chattahoochee
Austell Box Board Company	Sweetwater Creek	1.20	0.94	Cobb
Cobb Co - Marietta Water Auth	Chattahoochee River	64.00	64.00	Cobb
Georgia Power Co - Atkinson	Chattahoochee River	432.00	432.00	Cobb
Georgia Power Co - McDonough	Chattahoochee River	394.00	394.00	Cobb
Sweetwater Paper Board Company	Sweetwater Creek	0.65	0.60	Cobb
Coweta County Commissioners	Wahoo Creek	1.00	0.85	Coweta
Georgia Power Co - Plant Yates	Chattahoochee River	720.00	700.00	Coweta
Newnan, City of	Sandy/Browns Creek	8.00	8.00	Coweta
McRae and Stolz, Inc.	Lake Lanier	0.78	0.50	Dawson
Dekalb Co Public Works - Water & Sewer	Chattahoochee River	140.00	140.00	Dekalb
Douglasville - Douglas County W & S	Anneewakee Creek	1.49	1.49	Douglas
Douglasville - Douglas County W & S	Dog River Reservoir	10.00	10.00	Douglas
Douglasville - Douglas County W & S	Dog River	8.00	8.00	Douglas
Douglasville - Douglas County W & S	Bear Creek	6.40	6.00	Douglas
East Point, City of	Sweetwater Creek	13.20	11.50	Douglas
Great Southern Paper Co.	Chattahoochee River	144.00	115.00	Early
Centex Real Estate Corporation	Man-made Lakes	0.75	0.50	Forsyth
Cumming, City of	Lake Sidney Lanier	21.00	18.00	Forsyth
Forsyth County Board of Commissioners	Lake Lanier	16.00	14.00	Forsyth
Lanier Golf Club	Golf Course Pond #1	0.29	0.21	Forsyth
Martin Marietta Aggregates - Buckhorn Quarry	Sump Pit	1.50	0.60	Forsyth
Atlanta Athletic Club	Chattahoochee River	0.86	0.43	Fulton
Atlanta, City of	Chattahoochee River	180.00	180.00	Fulton
Atlanta-Fulton Co. Water Res. Commission	Chattahoochee River	56.00	56.00	Fulton
Cherokee Town & Country Club	Bull Sluice Lake	0.72	0.43	Fulton
Fuji Development USA, Ltd.	Big Creek	2.00	1.00	Fulton
Olde Atlanta Golf Club, LP	Man Made Lakes	0.75	0.50	Fulton
Palmetto, City of	Cedar Creek	0.60	0.45	Fulton
Riverfarm Enterprises, Inc.	Johns Creek	1.15	0.50	Fulton
Roswell, City of - Big Creek	Big Creek	1.20	1.20	Fulton
Standard Golf Club	Unnamed Trib to Johns Cr.	0.75	0.60	Fulton

Table 3-2. (Continued)

Facility	Source	24 hr Max (MGD)	Mo. Avg (MGD)	County
Tattersall Club Corp	Chattahoochee River	0.25	0.25	Fulton
Buford, City of	Lake Sidney Lanier	2.50	2.00	Hall
Fulton County Board of Commissioners	Chattahoochee River	0.30	0.30	Gwinnett
Clarkesville City of	Soque River	1.50	1.00	Habersham
Cornelia, City of	Camp Cr, sup.big Hazel Cr	4.00	4.00	Habersham
Demorest, City of	Chattahoochee River	4.00	3.00	Habersham
Habersham Mills	Soque River	233.00	215.00	Habersham
Gainesville, City of	Lake Sidney Lanier	25.00	20.00	Hall
Gwinnett County Water & Sewerage Auth	Lake Sidney Lanier	120.00	105.00	Hall
Lake Lanier Islands Development Auth	Lake Sidney Lanier	0.60	0.60	Hall
Stouffer Pineisle Resort	Lake Sidney Lanier	0.60	0.60	Hall
Harris County Water Dept	Bartlett's Ferry Res	3.00	3.00	Harris
Wellington Sears Co. - Langdale Mill	Chattahoochee River	8.30	8.30	Harris
West Point Pepperell - Fairfax Mill	Chattahoochee River	4.00	3.50	Harris
West Point Pepperell - Service Ctr	Chattahoochee River	8.00	5.80	Harris
Franklin Aluminum Company, Inc.	Hillabahatchee Creek	0.10	0.04	Heard
Georgia Power Co - Plant Wansley	Service Water Reservoir	89.10	65.40	Heard
Georgia Power Company - Plant Wansley	Chattahoochee River	60.00	60.00	Heard
Heard County Water Authority	Centralhatchee Creek	2.00	1.50	Heard
Dahlonega, City of - New Plant	Yahoola Creek	1.00	0.75	Lumpkin
Dahlonega, City of - Old Plant	Yahoola Creek	0.50	0.50	Lumpkin
Columbus, City of	Lake Oliver	67.50	58.00	Muscogee
Continental Carbon	Chattahoochee River	0.30	0.22	Muscogee
Eagle & Phenix Hydro Project, Inc.	Chattahoochee River			Muscogee
Fieldcrest Mills, Inc. - Plant 1	Chattahoochee River	1.70	1.60	Muscogee
Fieldcrest Mills, Inc. - Plant 2	Chattahoochee River	2.60	2.40	Muscogee
Smiths Water Authority	Lake Oliver	4.00	4.00	Muscogee
Martin Marietta - Junction City Quarry	Pit Sump	2.30	0.24	Talbot
Hogansville, City of	Blue Creek Res	1.00	1.00	Troup
Lagrange, City of	West Point Lake	17.60	16.00	Troup
West Point, City of	Chattahoochee River	2.10	1.80	Troup
Cleveland, City of	Turner Creek	0.50	0.40	White
White County Water & Sewer Authority	Turner Creek	2.00	1.80	White

Table 3-2. (Continued)

Facility	Source	24 hr Max (MGD)	Mo. Avg (MGD)	County
Alabama Permits				
Chattahoochee Valley Water Supply District	Chattahoochee River	8.00		Chambers
Wellington Sears Langdale	Chattahoochee River	8.00		Chambers
SNC Farley Nuclear Plant	Chattahoochee River	140.00		Houston
Opelika Water Works Board	Halawakee Creek	6.00		Lee
Phenix City Utilities	Chattahoochee River	9.00		Lee
Smiths Water and Sewer Authority	Chattahoochee River	3.40		Lee
Mead Coated Board, Inc.	Chattahoochee River	12.50		Russell

Note: Permits are not required for withdrawals of less than 100,000 gallons per day on a monthly average.

In the Piedmont part of the Chattahoochee River Basin most agricultural water is for livestock and aquaculture, and is supplied from surface water. In the Coastal Plain part of the Chattahoochee River Basin most agricultural water is for crops and orchards, and ground water supplies 44 percent of this water demand. Unlike municipal, industrial, and cooling water withdrawals, practically none of the water withdrawn for agricultural use is returned to streams.

Sixteen power-generating plants located along the mainstem Chattahoochee River use the water resources of the basin (Figure 2-9), including eleven hydropower facilities, four fossil fuel generating facilities, and one nuclear plant (Couch et al., 1996). Two additional power-generating plants shown on Figure 2-9 are located at the outflow of Lake Seminole. Instream water use by the eleven hydroelectric plants constitutes nearly the entire flow within the river, except during flood conditions, but is nonconsumptive.

Of the 14 mainstem dams in the basin, only George W. Andrews Lock and Dam and City Mills are not operated for hydroelectric power production. The first power-generating dam was the Eagle-Phenix Dam, which was originally constructed in 1834 and reconstructed in 1865 to

Table 3-3. Agricultural Water Demand for the Chattahoochee River Basin

Year	Piedmont Chattahoochee	Coastal Chattahoochee	Total
1992	10401	10394	20795
1995	11266	13430	24696
2000	11849	15572	27421
2010	13001	20444	33445
2020	13625	23737	37362
2050	15755	36120	51875

(Georgia and Alabama) (MG per year, including crops/orchards, turf, nursery, livestock/poultry, and aquaculture demand, from NRCS, 1996, Based on Medium Demand Projections without Water Conservation)

provide hydropower to the Eagle and Phenix Mill. Eight dams are located on the Chattahoochee River just north of Columbus to take advantage of the natural gradient at the Fall Line (Figure 2-9). The total hydroelectric generation capacity is 699,720 kilowatts in the ACF River basin (Fanning *et al.* , 1991).

Power Generation Water Demand

Water for thermoelectric-power generation is considered an off stream use of water, and generally is moderately consumptive to non-consumptive. Thermoelectric power is generated at four fossil-fuel plants and one nuclear power plant located in the Chattahoochee River Basin. Power generated at these plants totaled 33,460 gigawatts per hour and withdrew about 1650 MGD, most of which was returned to the river. Surface-water withdrawals for thermoelectric power generation decreased from 1980 to 1990 because of increased recirculation of cooling water. Thermal plants Farley, Yates, and Wansley on the Chattahoochee together consumed about 25 MGD in 1990. Other thermoelectric plants are essentially nonconsumptive.

Navigational Water Demand

Navigation has been an historical use of the Chattahoochee River Basin from Apalachicola Bay to the Fall Line. Before the Civil War, the city of Apalachicola, Florida was a major cotton port. Between 1828-60, 130 steamboats operated on the Chattahoochee, Flint, and Apalachicola Rivers (Owens, 1969). During the Civil War, the Apalachicola and Chattahoochee Rivers were of strategic significance to the Confederacy, and several Civil War naval battles occurred on the Chattahoochee River (Turner, 1988).

Federal support for navigation dates back to 1824, when the U.S. Army Corps of Engineers was authorized by Congress to maintain a navigational channel. The U.S. Rivers and Harbor Act of 1946 authorized the maintenance of a 9-foot deep and 100-foot wide channel from the mouth the Apalachicola River to Columbus, Ga., on the Chattahoochee River. A series of three navigation locks and dams are operated by the U.S. Army Corps of Engineers (Table 2-1). Walter F. George Lock and Dam, George W. Andrews Lock and Dam, and Jim Woodruff Lock and Dam are on the Chattahoochee River in the Coastal Plain Province.

The ability to use barges in the basin depends on having enough depth (at least 7 feet, and preferably 9 feet in the channel). Upstream of locks and dams, water depths can be maintained by replacing the water lost through lockage, evaporation, and reservoir releases. Below Jim Woodruff Lock and Dam, however, channel reliability on the Apalachicola River has been lower than predicted, and use of the channel dropped considerably during the 1980's when droughts frequently reduced channel depths.

Recreation

Because of proximity to the largest metropolitan area in the Southeast, the Chattahoochee and its reservoirs and tributaries are heavily used for recreation. The upper part of the Chattahoochee River Basin contains several heavily used reservoirs, national forests, and national and state parks. For example, Lake Sidney Lanier, located north of Atlanta, has more than 16 million visitors annually, and one of the highest visitation rates among U.S. Army Corps of Engineers reservoirs nationwide (U.S. Army Corps of Engineers, 1989).

The headwaters of the Chattahoochee River rise in the scenic mountains of northern Georgia and flow southwestward. Northern Georgia contains parts of the Chattahoochee National

Forest, several State parks, and resort communities which are favorite weekend and vacation destinations. Water related recreational activities include swimming, fishing, boating, camping, hiking, photography, etc. Within Metropolitan Atlanta, the Chattahoochee River National Recreation Area of the National Park Service has improved access to the river by providing parks and boat ramps along the river corridor. Tubing, rafting, and fly fishing are popular activities upstream of the confluence of Peachtree Creek and the Chattahoochee River.

Recreational fisheries of the Chattahoochee River Basin consist of a cold-water trout fishery in the mountains above Lake Sidney Lanier and in the river below Buford Dam, where hypolimnetic releases provide cold water necessary for trout habitat. The 49-mile reach of the Chattahoochee River from Buford Dam to Peachtree Creek has been managed by the WRD since 1960 as a trout fishery. Lake Lanier also supports an active warmwater fishery.

Warm-water recreational fisheries exist in the remainder of the Chattahoochee River Basin for various species of bass, catfish, and sunfish. Recreational fishing activities in West Point Lake, Lake Walter F. George, and Lake Seminole support local, economically significant businesses and services, including bait and tackle shops, guide services, tournaments, hotels, and restaurants.

Fish and Wildlife Water Demand

Two Fish and Wildlife facilities utilize surface water in the Chattahoochee Basin (Ziewitz et al., 1996). The WRD operates a trout hatchery (Buford Trout Hatchery) on the banks of the Chattahoochee River about 1.5 miles downstream from Buford Dam. This hatchery uses an average of 7.02 MGD of water from the Chattahoochee River to support operations and rears approximately 150,000 pounds of trout annually, providing about one third of the trout produced by the state for stocking public streams and lakes. Eufaula National Wildlife Refuge pumps water from Lake Walter F. George in the fall to flood several impoundments for waterfowl habitat. The refuge also pumps water in the summer to irrigate crops on the same fields that are flooded in the fall.

Waste Assimilation Water Demand

Water quantity, wastewater treatment, and wastewater discharge permitting are addressed in Section 4. However, it should be noted that the guidelines for discharge of treated effluent into the rivers and streams of the Chattahoochee River Basin assume that sufficient surface water flow will be available to assimilate waste and ensure that water quality criteria will be met. At the present time, two specific instream flow rates have been established as guidelines for waste assimilation purposes: a minimum flow of 750 cfs in the Chattahoochee River at Peachtree Creek and a minimum flow of 1,150 cfs in the Chattahoochee River at Columbia.

Environmental Water Demands

EPD recognizes the importance of maintaining suitable aquatic habitat in Georgia's lakes and streams for support of viable communities of fish and other aquatic organisms. Much of the mainstem of the Chattahoochee River, especially from Lake Lanier south, has been altered drastically by human activities, both physically and with regard to flows. From a water quantity perspective, aquatic habitat is adversely affected by unnatural extreme variations in lake levels and river flow. One significant issue which is receiving increasing attention from EPD is that of the minimum stream flow rate which must be maintained below a reservoir. A current state requirement is to maintain the 7Q10 flow (7-day average low flow with a once in

ten years recurrence interval), when water is available upstream. Consideration is being given to an increase in this minimum flow requirement under recommendations of WRD (Evans and England, 1995).

In September of 1996, the Directors of the Environmental Protection Division (EPD) and the Wildlife Resources Divison (WRD) empaneled a multi-disciplinary group of stakeholders to reveiw EPD's current minimum streamflow policy to determine if modifications should be made. EPD's current minimum flow policy is to protect the lowest seven-day average flow which would have occurred during any ten-year period for a stream (commonly called the 7Q10). Over a period of a year, the stakeholder group worked through a number of issues related to the current policy, and determined that it was not in the best interest of instream biological diversity and protection of aquatic habitats to continue with a 7Q10 minimum flow policy. The group also concluded that an insuficient number of instream flow studies had been conducted in Georgia in which to base a long-term modification to the current policy; however there was sufficient relevant national scientific information on which to base several interim modifications to the current policy. Consequently, on November 20, 1997, the stakeholder group submitted a final recommendation paper to Directors of EPD and WRD in which an interim flow policy was described.

This interim policy recommended by the stakeholder group allows future new surface water permit applicants, as well as those current permit holders who seek modifications in their permitted withdrawal quanitities to select one of three methods for determining the streamflow quantities to be protected the withdrawal site. These options are as follows:

A. Monthly 7Q10

For a water supply reservoir, the applicant is at all times required to release the lesser of the monthly 7Q10 or the inflow to the reservoir. For an instream withdrawal, the applicant is at all times required to pass the lesser of the monthly 7Q10 or the inflow to the withdrawal point.

B. Site-Specific Instream Flow Study

The applicant may perform a site-specific instream flow study to determine what minimum flow conditions must be maintained for protection of aquatic habitat. Prior to commencing such an instream flow study, the applicant must receive prior approval of the study design from the Department of Natural Resources. Upon the applicant's completion of the instream flow study, the Department of Natural Resources will evaluate the study results and render a decision regarding the minimum flows which must be preserved by the applicant.

C. Wildlife Resources Division Recommendation

30 Percent Mean Annual Flow (Unregulated)
On unregulated streams (i.e., streams with no stream flow regulation structures), the applicant is at all times required to allow the lesser of 30 percent of the mean annual flow of the stream, or the inflow, to pass the instream withdrawal point.

30/60/40 Percent Mean Annual Flow (Regulated Streams)
On regulated streams, the applicant is at all times required to release from a water supply reservoir, the lesser of 30 percent of the mean annual flow or inflow during the months of July through November; 60 percent of the mean annual flow or inflow during the months of January through April; and 40 percent of the mean annual flow or inflow during the months of May, June, and December.

These options would be available to applicants for new and modified permits until sufficient site-specific information is available in Georgia to develop a permanent modification of the current policy. Current holders of surface water withdrawal permits would be "grandfathered" for the current permit limits.

The Directors of EPD and WRD are currently considering the recommendation, and are expected to make a decision regarding the recommendation in early 1998. At that time an implementation schedule will be determined.

3.2.3 Surface Water Withdrawal Permitting

The 1977 Surface Water Amendments to the Georgia Water Quality Control Act of 1964 require all non-agricultural users of more than 100,000 GPD on a monthly average (from any Georgia surface water body) to obtain a permit for this withdrawal from EPD. These users include municipalities, industries, military installations, and all other non-agricultural users. The statute stipulates that all pre-1977 users who could establish the quantity of their use prior to 1977 would be "grandfathered" for that amount of withdrawal. Table 3-2 lists the permits in effect in the Chattahoochee River Basin.

Applicants are required to submit details relating to the source of withdrawals, demand projections, water conservation measures, low flow protection measures (for non-grandfathered withdrawals), and raw water storage capacities. EPD issued permit identifies the source of withdrawal, the monthly average and maximum 24-hour withdrawal, the standard and special conditions under which the permit is valid, and the expiration date of the permit. The standard conditions section of the permit generally defines the reporting requirements (usually annual submission of monthly average withdrawals); the special conditions section of the permit usually specifies measures the permittee is required to undertake so as to protect downstream users and instream uses (e.g. waste assimilation, aquatic habitat). The objective of these permits is to manage and allocate water resources in a manner that both efficiently and equitably meets the needs of all the users.

The 1988 Amendments to the Water Quality Control Act establish the permitting authority within EPD to issue farm irrigation water use permits. As with the previously mentioned surface water permitting statute, the lower threshold is 100,000 GPD; however users of less water may apply for and be granted a permit. With two exceptions, farm use is defined as irrigation of any land used for general farming, aquaculture, pasture, turf production, orchards, nurseries, watering for farm animals and poultry, and related farm activities. One relevant exception is that the processing of perishable agricultural products and the irrigation of recreational turf in the Chattahoochee River watershed upstream from Peachtree Creek are not considered farm uses.

Applicants for these permits who can establish that their use existed prior to July 1, 1988, and when these applications are received prior to July 1, 1991, are "grandfathered" for the operating

capacity in place prior to July 1, 1988. Other applications are reviewed and granted with an eye towards protection of grandfathered users and the integrity of the resource. Generally, agricultural users are not required to submit any water use reports.

3.2.4 Flooding and Floodplain Management

Sometimes the issue is not the lack of water, but too much water. Floods, as well as droughts, can be very damaging natural hazards. Almost all of Georgia is susceptible to the threat of floods. The Georgia Emergency Management Agency (GEMA) ranks floods as the number one natural hazard in Georgia. Over the past nineteen years, 57 Georgians have lost their lives due to flooding. The Flood of 1994 (Tropical Storm Alberto) is considered the worst flooding event in Georgia since 1841, which is the beginning of the State's recorded flood history. Much of the flooding in 1994 resulted from the overflowing of the Flint River and the Ocmulgee River and, to a much lesser extent, the Chattahoochee River.

In July 1994, rainfall from Tropical Storm Alberto caused severe flooding in the Flint River basin. These floods affected hundreds of thousands of people, damaging or destroying highways, water-supply systems, wastewater treatment plants, crops, and homes. Damage from such a severe flood cannot be averted completely, but with sound hydrologic information, reliable estimates of river stages and of discharges can be made. Using these data, emergency management personnel can provide ample warning of impending danger to communities.

Development within the floodplains of these rivers is also a concern, especially when a community has no means of regulating the development. Development within floodplain areas can increase flood levels, thereby increasing the number of people and the amount of property at risk. Although the term "floodplain management" is often used as a synonym for program or agency-specific projects and regulations, it is in fact quite a broad concept. It is a continuous process of making decisions about whether floodplains are to be used for development and how they are to be developed. It encompasses the choices made by owners of floodplain homes and businesses, developers, and officials at all levels of government.

3.3 Ground Water Quantity

3.3.1 Ground Water Sources

As part of the Apalachicola-Chattahoochee-Flint and Alabama-Coosa-Tallapoosa (ACF/ACT) Comprehensive Basin Study, scientists at USGS completed studies of ground water resources in each of eight geographic subareas of the ACF/ACT basins. The Chattahoochee River Basin is coincident with sub-areas 1 through 3 of this study, and a portion of sub-area 4.

Ground water Subarea 1 constitutes the upper Chattahoochee River Basin above Whitesburg, Georgia, and contains parts of the Blue Ridge and Piedmont physiographic provinces (Chapman and Peck, 1995a). These provinces are underlain by crystalline-rock aquifers (metamorphic and igneous rocks) having little or no primary porosity. The yield of bedrock wells depends on the characteristics of the water-bearing zones penetrated by the open borehole. Well yields greater than 100 gal/min (0.144 MGD) are considered to be high-yielding. Yields of 200 to 300 gal/min (0.288 to 0.432 MGD) are not uncommon when wells are properly sited. USGS analyzed ground water contributions to flow in the Chattahoochee River using hydrograph separation. For the Chattahoochee flow measured at Whitesburg above West Point Lake, the mean annual transfer of ground water to surface water discharge is estimated to be 2,720 cubic feet per second.

Chapman and Peck (1995a) conclude that ground water resources are underutilized within Subarea 1. Most communities, particularly in the metropolitan Atlanta area, rely solely on surface water resources for water supply. Ground water could serve as a supplemental resource during many peak demand periods and under drought conditions.

Subarea 2 includes the part of the Chattahoochee River Basin between Whitesburg and Columbus, and is within the Piedmont physiographic province (Chapman and Peck, 1995b). Ground water resource conditions are thus similar to those in Subarea 1, and, like Subarea 1, ground water resources in Subarea 2 are thought to be underutilized. Ground water also contributes to surface flow within Subarea 2. The estimated mean annual ground-water discharge contribution to the Chattahoochee River at Columbus, Georgia is estimated to be about 4,620 cubic feet per second, of which 504 cubic feet per second is derived from Alabama.

Subarea 3 includes the part of the Chattahoochee River Basin between Columbus and Early Co., and is within the Southeastern Coastal Plain physiographic province (Southern Coastal Plain and Georgia Sand Hills land-resource areas) (Mayer, 1995). The aquifer system in Subarea 3 is comprised of sedimentary rock sequences that dip and thicken to the south. The outcrop area of the sedimentary rocks functions as the recharge area of the aquifers, receiving precipitation that infiltrates down to the saturated zone. Most of the water that enters the aquifers as recharge is eventually discharged to nearby streams or rivers. Under average conditions, 1,619 cfs is discharged from the ground water flow system to the Chattahoochee River, of which 63 percent originates in Georgia and 37 percent in Alabama. In contrast, during the severe drought of 1986, 341 cfs was discharged to the Chattahoochee River, of which 85 percent originated in Georgia. Total 1990 ground water withdrawals in the Chattahoochee River Basin portion of Subarea 3 equaled about 1 ½ percent of the mean annual ground-water discharge, and about 6 percent of the 1986 drought discharge (Mayer, 1995). Of this withdrawal, about 25 percent occurs in Georgia and 75 percent in Alabama.

Subarea 4 includes a portion of the southern Chattahoochee River Basin (Torak and McDowell, 1994), and is also within the Southern Coastal Plain province. This area is underlain by Coastal Plain sediments consisting of alternative units of sand, clay, sandstone, dolomite and limestone that gradually thicken and dip gently to the southeast. The primary water-bearing system is the Upper Floridan aquifer. This aquifer has a high capacity to store and transmit water, attributable to the fractured nature of the constituent Ocala limestone and associated dissolution of limestone by ground water

3.3.2 Ground Water Supply Demands

Municipal and Industrial Uses

Ninety-nine percent of the Chattahoochee basin M&I water demand in 2005 is projected to be supplied by surface water withdrawals (458 MGD). The ground water withdrawals are projected to be only 4 MGD in the Chattahoochee basin. Ground water pumpage is expected to intercept some water that would have surfaced in the streams, and this amount can be viewed as ground water demand that is effectively supplied by surface water. This effect depends on the geology of the basin. In the Chattahoochee River Basin outside of sub-area 4, the ground water demand can also be viewed as an equivalent amount of surface water demand.

Agricultural Water Demand

Total agricultural water demand for the Chattahoochee River Basin is discussed above in Section 3.2.2, and is derived from surface and ground water sources. In the Piedmont Chattahoochee sub-basin most agricultural water is for livestock and aquaculture, and is supplied from surface water. In the Coastal Chattahoochee sub-basin most agricultural water is for crops and orchards, and ground water supplies 44 percent of this water demand.

3.3.3 Ground Water Supply Permitting

The Georgia Ground Water Use Act of 1972 requires permits from EPD for all non-agricultural users of ground water of more than 100,000 GPD. General information required of the applicant includes location (latitude and longitude), past, present, and expected water demand, expected unreasonable adverse effects on other users, the aquifer system from which the water is to be withdrawn, and well construction data. The permits issued by EPD stipulate both the allowable monthly average and annual average withdrawal rates, standard and special conditions under which the permit is valid, and the expiration date of the permit. Ground water use reports are generally required of the applicant on a semi-annual basis. The objective here is the same as with surface water permits. A list of active Georgia municipal and industrial ground water withdrawal permits is provided in Table 3-4.

The 1988 Amendments to the Ground Water Use Act establishes the permitting authority within EPD to issue farm irrigation water use permits. As with the previously mentioned ground water permitting statute, the lower threshold is 100,000 GPD; however users of less water may apply and be granted a permit. With two exceptions, farm use is defined as irrigation of any land used for general farming, aquaculture, pasture, turf production, orchards, nurseries, watering for farm animals and poultry, and related farm activities. One exception relevant to the Chattahoochee River Basin is that the processing of perishable agricultural products and the irrigation of recreational turf in the Chattahoochee River watershed upstream from Peachtree Creek are not considered farm uses. Agricultural withdrawal permits are too numerous to list in this document.

Applicants for these permits who can establish that their use existed prior to July 1, 1988, and when their applications are received prior to July 1, 1991, are "grandfathered" for the operating capacity in place prior to July 1, 1988. Other applications are reviewed and granted with an eye towards protection of grandfathered users and the integrity of the resource. Generally, agricultural users are not required to submit any water use reports.

Table 3-4. Active Municipal and Industrial Ground Water Withdrawal Permits in the Chattahoochee River Basin

County	Permit #	Type	Permit User	Monthly Permitted Flow (MGD)	Yearly Permitted Flow (MGD)	Aquifer
Chattahoochee	026-0002	Municipal	Chattahoochee Co. Water System	0.330	0.330	Cretaceous Sand
Chattahoochee	026-0001	Municipal	City of Cusseta	0.310	0.260	Cretaceous Sand
Clay	030-0001	Municipal	City of Fort Gaines	0.310	0.220	Providence Sand
Cobb	033-0002	Municipal	Cobb-Marietta Water Authority	0.150	0.020	Crystalline Rock
Cobb	033-0001	Municipal	Cobb-Marietta Water Authority	0.900	0.150	Crystalline Rock
Early	049-0003	Municipal	City of Blakely	2.700	2.700	Clayton, Claiborne, Cretaceous Sand
Early	049-0004	Industrial	Georgia Tubing Co.	0.504	0.504	Claiborne, Tallahatta, Wilcox
Early	049-0001	Industrial	Great Southern Paper Co.	0.200	0.125	Tallahatta, Wilcox, Clayton
Forsyth	058-0001	Industrial	Laurel Springs Farm Golf Course	0.400	0.160	Crystalline Rock
Fulton	060-0004	Industrial	Digital Equipment Corp.	0.150	0.150	Crystalline Rock
Fulton	060-0005	Industrial	Ford Motor Co. - Atlanta	0.291	0.291	Crystalline Rock
Fulton	060-0002	Industrial	Nabisco Brands, Inc.	0.100	0.100	Crystalline Rock
Habersham	068-0001	Municipal	Town of Alto	0.700	0.500	Crystalline Rock
Hall	069-0004	Industrial	Con Agra Broiler Co.	0.300	0.300	Crystalline Rock
Hall	069-0002	Industrial	Fieldale Farms Corp.	1.200	1.200	Crystalline Rock
Harris	072-0002	Municipal	City of Hamilton	0.115	0.115	Crystalline Rock
Harris	072-0001	Industrial	Ida Cason Calloway Foundation	0.500	0.400	Crystalline Rock

Table 3-4. (Continued)

County	Permit #	Type	Permit User	Monthly Permitted Flow (MGD)	Yearly Permitted Flow (MGD)	Aquifer
Heard	074-0001	Municipal	City of Franklin	0.250	0.200	Crystalline Rock
Lumpkin	093-0001	Municipal	City of Dahlonega	0.231	0.231	Crystalline Rock
Stewart	128-0002	Municipal	City of Lumpkiin	0.250	0.250	Cretaceous Sand
Troup	141-0001	Industrial	Dominion Engineered Textiles	0.100	0.100	Crystalline Rock
White	154-0002	Municipal	City of Cleveland	0.225	0.225	Crystalline Rock
White	154-0001	Municipal	City of Helen	0.290	0.290	Crystalline Rock

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